

Listing of the Claims:

1. (currently amended) An integrated process for the production of a dialkyl carbonate and a diol from an alkylene oxide, carbon dioxide and an aliphatic monohydric alcohol comprising:

(a) reacting an alkylene oxide with carbon dioxide in the presence of a homogeneous carbonation catalyst in a first reaction zone at a temperature in the range of about 50 to 250 °C and at a pressure of at least about 1379 kPa (200 psi) to provide a crude cyclic carbonate stream comprising a cyclic carbonate and homogeneous carbonation catalyst in an amount of 0.1 to 5 wt%;

(b) directing said crude cyclic carbonate stream into a second reaction zone; and

(c) reacting said cyclic carbonate with an aliphatic monohydric alcohol in said second reaction zone in the presence of said homogeneous carbonation catalyst to provide a crude product stream comprising a dialkyl carbonate and diol, wherein said crude cyclic carbonate stream has not been subjected to a separation other than to remove an amount of unreacted alkylene oxide, an amount of unreacted carbon dioxide, or both;

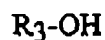
wherein said homogeneous carbonation catalyst of (a) and (c) is a mixture comprising a halide containing component and a bicarbonate.

2. (original) The process of Claim 1, wherein said alkylene oxide is of the formula:



wherein R_1 and R_2 independently of one another denote a divalent group represented by the formula $-(CH_2)_m-$, wherein m is an integer from 1 to 3, which is unsubstituted or substituted with at least one substituent selected from the group consisting of C_1 - C_{10} alkyl group and a C_6 - C_{10} aryl group, wherein R_1 and R_2 can share the same substituent; and

said aliphatic monohydric alcohol is of the formula:



wherein R₃ is a monovalent aliphatic C₁-C₁₂ hydrocarbon group which is unsubstituted or substituted with at least one substituent selected from the group consisting of a C₁-C₁₀ alkyl group and a C₆-C₁₀ aryl group.

3. (currently amended) The process of Claim 1, wherein said ~~homogeneous carbonation catalyst bicarbonate~~ comprises sodium bicarbonate ~~a basic component and a halide containing component.~~

4. (currently amended) The process of ~~Claim 3~~ Claim 1, wherein ~~said basic component is selected from the group consisting of: carbonates, bicarbonates, acetates, amines, phosphines and mixtures thereof, and said halide containing component is selected from the group consisting of: alkali halides, quaternary ammonium halides and mixtures thereof.~~

5. (original) The process of Claim 1, wherein said pressure is in the range of about 3448 kPa to 6897 kPa (500 to 1000 psig) and the temperature is in the range of about 150 to 200°C.

6. (original) The process of Claim 1, wherein the molar ratio of CO₂ to alkylene oxide is in the range from about 1.05 to 1.10 and the molar ratio of aliphatic monohydric alcohol to cyclic carbonate is in the range from about 2:1 to 6:1.

7. (original) The process of Claim 1, wherein said crude cyclic carbonate stream further comprises glycol impurities in an amount of up to 40% by weight, based upon total weight of said crude cyclic carbonate stream.

8. (original) The process of Claim 7, wherein said cyclic carbonate is ethylene carbonate, said aliphatic monohydric alcohol is methanol, and said glycol impurities comprise ethylene glycol and higher molecular weight glycols.

9. (original) The process of Claim 1, wherein said aliphatic monohydric alcohol contains dialkyl carbonate in an amount of up to 40% by weight, based upon the total weight of said aliphatic monohydric alcohol and said dialkyl carbonate.

10. (original) The process of Claim 1, further comprising a step of recovering said dialkyl carbonate and said diol from said crude product stream.

11. (previously presented) The process of Claim 1, further comprising:
(i) separating a first recycle stream comprising unreacted aliphatic monohydric alcohol from said crude product stream;
(ii) recycling said first recycle stream to transesterification step (c);
(iii) separating a second recycle stream comprising unreacted cyclic carbonate and said homogeneous carbonation catalyst from said crude product stream;
and
(iv) recycling at least a portion of said second recycle stream to said carbonation step (a) and/or at least a portion of said second recycle stream to said transesterification step (c).

12. (original) The process of Claim 2, wherein said cyclic carbonate is ethylene carbonate and said aliphatic monohydric alcohol is methanol.

13. (previously presented) The process of Claim 1, wherein said second reaction zone is a reaction vessel selected from the group consisting of: a reactive distillation column, a distillation column with at least a plurality of reaction zones, a distillation column with a plurality of reaction zones having heat exchangers disposed between the distillation column and each reaction zone, and a distillation column with a plurality of reaction zones wherein bottoms thereof are optionally recycled to the distillation column.

Claims 14-54 (cancelled)

55. (currently amended) An integrated process for the production of dialkyl carbonate and a diol from an alkylene oxide, carbon dioxide and an aliphatic monohydric alcohol consisting essentially of:

(a) reacting an alkylene oxide with carbon dioxide in the presence of a homogeneous carbonation catalyst in a first reaction zone at a temperature in the range of about 50 to 250 °C and at a pressure of at least about 1379 kPa (200 psi) to provide a crude cyclic carbonate stream comprising a cyclic carbonate and homogeneous carbonation catalyst;

(b) directing said crude cyclic carbonate stream into a second reaction zone; and

(c) reacting said cyclic carbonate with an aliphatic monohydric alcohol in said second reaction zone in the presence of said homogeneous carbonation catalyst to provide a crude product stream comprising a dialkyl carbonate and diol, wherein said crude cyclic carbonate stream has not been subjected to a separation other than to remove an amount of unreacted alkylene oxide, an amount of unreacted carbon dioxide, or both;

wherein said homogeneous carbonation catalyst of (a) and (c) is a mixture comprising a halide containing component and a bicarbonate.

56. (currently amended) An integrated process for the production of dialkyl carbonate and a diol from an alkylene oxide, carbon dioxide and an aliphatic monohydric alcohol comprising:

(a) reacting an alkylene oxide with carbon dioxide in the presence of a homogeneous carbonation catalyst in a first reaction zone at a temperature in the range of about 150 to 200 °C and at a pressure of at least about 1379 kPa (200 psi) to provide a crude cyclic carbonate stream comprising a cyclic carbonate and homogeneous carbonation catalyst;

(b) directing said crude cyclic carbonate stream into a second reaction zone; and

(c) reacting said cyclic carbonate with an aliphatic monohydric alcohol in said second reaction zone in the presence of said homogeneous carbonation catalyst at a temperature of about 75 to 170°C to provide a crude product stream comprising a dialkyl carbonate and diol, wherein said crude cyclic carbonate stream has not been subjected to a separation other than to remove an amount of unreacted alkylene oxide, an amount of unreacted carbon dioxide, or both;

(d) separating a first recycle stream comprising unreacted aliphatic monohydric alcohol from said crude product stream;

(e) recycling said first recycle stream to transesterification step (c);

(f) separating a second recycle stream comprising unreacted cyclic carbonate and said homogeneous carbonation catalyst from said crude product stream; and

(g) recycling at least a portion of said second recycle stream to said carbonation step (a) and/or at least a portion of said second recycle stream to said transesterification step (c);

wherein said homogeneous carbonation catalyst of (a), (c), and (f) is a mixture comprising a halide containing component and a bicarbonate.

57. (new) The process of Claim 1, wherein said bicarbonate comprises sodium bicarbonate and said halide containing component is selected from the group consisting of: potassium iodide, tetraethyl ammonium bromide and mixtures thereof.